

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and claims in the application:

Claim 1 (original): A nitride semiconductor light emitting element, comprising:

a substrate;

a lower clad layer formed of a nitride semiconductor containing Al and Ga stacked thereon;

a lower guide layer formed of a nitride semiconductor mainly containing In and Ga stacked thereon; and

an active layer including a nitride semiconductor mainly containing In and Ga stacked thereon; wherein

said lower guide layer has a first layer and a second layer higher in In content than said first layer, successively stacked from the active layer side.

Claim 2 (original): The nitride semiconductor light emitting element according to claim 1, wherein

$L_1 \geq 20\text{nm}$,

wherein L_1 is a distance from said second layer to a well layer at the substrate side in said active layer.

Claim 3 (original): The nitride semiconductor light emitting element according to claim 1, wherein

said active layer is a quantum well active layer, wherein

$\text{In}_{(x)2} - 0.10 \leq \text{In}_{(x)0} \leq \text{In}_{(x)2} + 0.10$

wherein $\text{In}_{(x)2}$ is In content of said second layer and $\text{In}_{(x)0}$ is In content of a well layer in said active layer.

Claim 4 (original): The nitride semiconductor light emitting element according to claim 1, wherein

said first layer is lower in In content than a well layer in said active layer.

Claim 5 (original): The nitride semiconductor light emitting element according to claim 1, wherein

said lower guide layer has a first layer, a second layer and a third layer lower in In content than said second layer, successively stacked from the active layer side.

Claim 6 (original): The nitride semiconductor light emitting element according to claim 5, wherein

said third layer has a fourth layer higher in In content than said third layer.

Claim 7 (original): The nitride semiconductor light emitting element according to claim 1, wherein

said second layer is a multiple quantum well layer, wherein

$$\text{In}_{(x)2}' - 0.10 \leq \text{In}_{(x)0} \leq \text{In}_{(x)2}' + 0.10$$

wherein $\text{In}_{(x)2}'$ is In content of a well layer in said second layer and $\text{In}_{(x)0}$ is In content of a well layer in said active layer.

Claim 8 (original): The nitride semiconductor light emitting element according to claim 1, further comprising

a seventh layer formed of a nitride semiconductor mainly containing In and Ga on and adjacent to said active layer.

Claim 9 (original): The nitride semiconductor light emitting element according to claim 1, wherein

said second layer functions as a saturable absorption layer.

Claim 10 (original): The nitride semiconductor light emitting element according to claim 9, wherein

said lower guide layer has a first layer, a second layer, and a third layer lower in In content than said second layer, successively stacked from the active layer side.

Claim 11 (original): The nitride semiconductor light emitting element according to claim 10, wherein

$$0\text{nm} \leq L_3 \leq 20\text{nm},$$

wherein L_3 is a thickness of said third layer.

Claim 12 (original): The nitride semiconductor light emitting element according to claim 10, wherein

said third layer has a fourth layer higher in In content than said third layer.

Claim 13 (original): The nitride semiconductor light emitting element according to claim 12, wherein

said fourth layer functions as a saturable absorption layer.

Claim 14 (original): The nitride semiconductor light emitting element according to claim 12, wherein

said second layer and said fourth layer are different in impurity concentration.

Claim 15 (original): The nitride semiconductor light emitting element according to claim 9, wherein

$$L_1 \geq 20\text{nm},$$

wherein L_1 is a distance from said second layer to a well layer at the substrate side in said active layer.

Claim 16 (original): The nitride semiconductor light emitting element according to claim 9, wherein

$$0.5\text{nm} \leq L_2 \leq 5.0\text{nm},$$

wherein L_2 is a thickness of said second layer.

Claim 17 (original): The nitride semiconductor light emitting element according to claim 9, wherein

said first layer is greater in substantial bandgap than said active layer.

Claim 18 (original): The nitride semiconductor light emitting element according to claim 9, wherein

said active layer is a quantum well active layer, wherein

$$E_{g2} - 0.02\text{eV} \leq E_{g0} \leq E_{g2} + 0.15\text{eV}, \text{ and}$$

$$\text{In}_{(x)2} - 0.10 \leq \text{In}_{(x)0} \leq \text{In}_{(x)2} + 0.10,$$

wherein $\text{In}_{(x)2}$ is In content of said second layer, E_{g2} is substantial bandgap of said second layer, $\text{In}_{(x)0}$ is In content of said active layer, and E_{g0} is substantial bandgap of said active layer.

Claim 19 (original): The nitride semiconductor light emitting element according to claim 9, wherein

said second layer is a multiple quantum well.

Claim 20 (original): The nitride semiconductor light emitting element according to claim 19, wherein

$$E_{g2}' - 0.02\text{eV} \leq E_{g0} \leq E_{g2}' + 0.15\text{eV}, \text{ and}$$

$$\text{In}_{(x)2}' - 0.10 \leq \text{In}_{(x)0} \leq \text{In}_{(x)2}' + 0.10,$$

wherein E_{g2}' is substantial bandgap of said second layer, $\text{In}_{(x)2}'$ is In content of a well layer in said second layer, $\text{In}_{(x)0}$ is In content of said active layer, and E_{g0} is substantial bandgap of said active layer.

Claim 21 (original): The nitride semiconductor light emitting element according to claim 19, wherein

$$0.5\text{nm} \leq L_2' \leq 5.0\text{nm},$$

wherein L_2' is a thickness of one well layer in said second layer of a multiple quantum well.

Claim 22 (original): The nitride semiconductor light emitting element according to claim 9, further comprising

a fifth layer and a sixth layer successively stacked from the active layer side between said first layer and said second layer, wherein

said fifth layer is higher in In content than said first layer, and said sixth layer is lower in In content than said fifth layer and said second layer.

Claim 23 (original): The nitride semiconductor light emitting element according to claim 22, wherein

$$L_5 \geq 20\text{nm},$$

wherein L_5 is a distance from said fifth layer to a well layer at the substrate side in said active layer.

Claim 24 (original): The nitride semiconductor light emitting element according to claim 22, wherein

said second layer and said fifth layer are different in impurity concentration.

Claim 25 (original): The nitride semiconductor light emitting element according to claim 9, further comprising

a seventh layer formed of a nitride semiconductor mainly containing In and Ga on and adjacent to said active layer.

Claim 26 (original): A method for manufacturing a nitride semiconductor light emitting element including a substrate, a lower clad layer formed of a nitride semiconductor containing Al and Ga stacked thereon, a lower guide layer formed of a nitride semiconductor mainly containing In and Ga stacked thereon, and an active layer including a nitride semiconductor mainly containing In and Ga stacked thereon, said lower guide layer having a first layer and a second layer higher in In content than said first layer successively stacked from the active layer side, wherein

$$\Delta T \leq 80^\circ\text{C},$$

wherein ΔT is variation in growth temperature from initiation of growth of said lower guide layer to initiation of growth of said active layer.

Claim 27 (original): A method for manufacturing a nitride semiconductor light emitting element including a substrate, a lower clad layer formed of a nitride semiconductor containing Al and Ga stacked thereon, a lower guide layer formed of a nitride semiconductor mainly containing In and Ga stacked thereon, and an active layer including a nitride semiconductor mainly containing In and Ga stacked thereon, said lower guide layer having a first layer and a second layer higher in In content than said first layer successively stacked from the active layer side, wherein

growth temperature of each layer from initiation of growth of said lower guide layer to initiation of growth of said active layer is at most 830°C.

Claim 28 (currently amended): A method for manufacturing a nitride semiconductor light emitting element including a substrate, a lower clad layer formed of a nitride semiconductor containing Al and Ga stacked thereon, a lower guide layer formed of a nitride semiconductor mainly containing In and Ga stacked thereon, and an active layer including a nitride semiconductor mainly containing In and Ga stacked thereon, said lower guide layer having a first layer, a second layer higher in In content than said first layer and functioning as a saturable absorption layer, and a third layer lower in In content than said second layer successively stacked from the active layer side, said third layer ~~having~~ surrounding a fourth layer higher in In content than said third layer, wherein

$$T_4 \leq T_2,$$

wherein T_2 is growth temperature of said second layer and T_4 is growth temperature of said fourth layer.

Claim 29 (original): A method for manufacturing a nitride semiconductor light emitting element including a substrate, a lower clad layer formed of a nitride semiconductor containing Al and Ga stacked thereon, a lower guide layer formed of a nitride semiconductor mainly containing In and Ga stacked thereon, and an active layer including a nitride semiconductor mainly containing In

and Ga stacked thereon, said lower guide layer having a first layer and a second layer higher in In content than said first layer and functioning as a saturable absorption layer successively stacked from the active layer side, said lower guide layer further having a fifth layer and a sixth layer successively stacked from the active layer side between said first layer and said second layer, said fifth layer being higher in In content than said first layer, and said sixth layer being lower in In content than said fifth layer and said second layer, wherein

$$T_5 \leq T_2,$$

wherein T_2 is growth temperature of said second layer and T_5 is growth temperature of said fifth layer.

Claim 30 (original): A method for manufacturing a nitride semiconductor light emitting element including a substrate, a lower clad layer formed of a nitride semiconductor containing Al and Ga stacked thereon, a lower guide layer formed of a nitride semiconductor mainly containing In and Ga stacked thereon, and an active layer including a nitride semiconductor mainly containing In and Ga stacked thereon, said lower guide layer having a first layer and a second layer higher in In content than said first layer and functioning as a saturable absorption layer successively stacked from the active layer side, wherein

at least one interface at which growth interruption is introduced is located in a range of

$$0\text{nm} \leq L_4 \leq 20\text{nm},$$

wherein L_4 is a distance between said interface and the second layer.

Claim 31 (original): The method for manufacturing a nitride semiconductor light emitting element according to claim 30, wherein

temperature variation of said substrate occurs at least once during said growth interruption.